#DEPLW0679

2004 Gulf Island Pond Aerial Monitoring Program

Androscoggin County, Maine

Prepared by

Maine Department of Environmental Protection

November 8, 2004

Executive Summary

During the summer of 2004, the Maine Department of Environmental Protection (DEP) conducted weekly aerial monitoring of Gulf Island Pond (GIP) and the Androscoggin River. The aerial monitoring was conducted in conjunction with the ambient monitoring program described in the Androscoggin River and Gulf Island Pond Data Report, DEP, November 2004 (Data Report). The aerial monitoring was conducted by DEP staff in a rented seaplane from the Turner airbase.

Aerial observations were recorded with a digital camera. Selected images are included with this report. Ambient water quality data was also collected by landing the seaplane and taking Secchi disk transparency readings and collecting water quality samples for laboratory analysis for total phosphorus and chlorophyll-a. This data was included in the analysis documented in the Data Report.

This report summarizes the observations from the aerial monitoring. Based on the aerial monitoring, and the ambient data documented in the Data Report, GIP experienced a widespread algae bloom on August 4, and localized algae blooms on July 21, August 25, and September 8 of 2004. Most of the bloom conditions observed occurred south of the GIP Oxygenation Project ("bubbler") in the pond basin (although there was localized bloom conditions on September 8th near the upper narrows monitoring station).

Please refer to the attached plan showing the generalized bloom locations. The most extensive bloom conditions occurred on August 4th and encompassed the area from the bubbler to the deep hole monitoring station.

All of the Secchi disk transparency data collected by the seaplane during the monitoring ranged between 2.0-2.65 meters. (See the Data Report for a summary of the data.)

The monitoring activities were suspended on September 9th and no further data were collected after that time due to the unusually cold and wet weather experienced during the late summer. In mid-August, flow in the river (8,000 cfs) was four (4) times normal conditions and unusually cold temperatures lowered the potential for additional bloom conditions.

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Background

An algae bloom in a Maine lake is currently defined as a planktonic growth of algae which causes Secchi depth to be less than 2 meters (DEP Regulation Chapter 581). In addition, DEP staff recommends that if apparent or true color exceeds 30 SPU, uncorrected chlorophyll-a should be greater than 8-12 ppb to confirm an algae bloom. Although GIP is legally classified as a river, it does not always act like a river (or even a lake). Water quality is not longitudinally uniform as would be expected in a lake. Data from 2004 indicated that color in GIP almost always exceeds 30 SPU.

Given the absence of statistical confidence in predicting an algae bloom based on chlorophyll-a concentration, data specific to GIP were correlated to bloom conditions. Observable bloom and scum layers were documented visually during ambient monitoring and threshold bloom levels were defined by the corresponding measured chlorophyll-a and color. In addition, aerial monitoring was completed to confirm the extent of blooms and scum layers in the pond. Significant D.O. supersaturation in the reading closest to the water surface generally confirms the occurrence of an algae bloom.

There were eight (8) locations that were part of the aerial monitoring program. Moving from GIP dam upriver they have been denoted as:

(1) Deep Hole-DH
(2) Gulf Island Pond #4-GIP4;
(3) Lower Narrows-LN;
(4) Upper Narrows-UN;
(5) Turner Center Bridge-TB;
(6) Twin Bridges-TwB;
(7) Androscoggin Lake-AL, and
(8) Dead River Dam-DRD.

OVERVIEW

The Department conducted aerial monitoring of GIP and the upper Androscoggin River to determine the extent and conditions for algae blooms. Observations were conducted weekly from June 23rd through September 8th, 2004, with the exception of July 14 when no flight was conducted due to weather conditions (however water chemistry data was obtained by travelling to the LN sampling location by boat).

The aerial monitoring was conducted using a seaplane departing from a seaplane base in Turner, Maine. A 4-place seaplane was utilized and afforded the opportunity to land on the river to collect water chemistry data if a bloom condition occurred where no data had previously been collected.

The seaplane departed from Turner, scheduled for 12 noon and proceeded to the LN station in order to collect water chemistry data. Secchi transparency data was collected along with total phosphorus and chlorophyll-a samples.

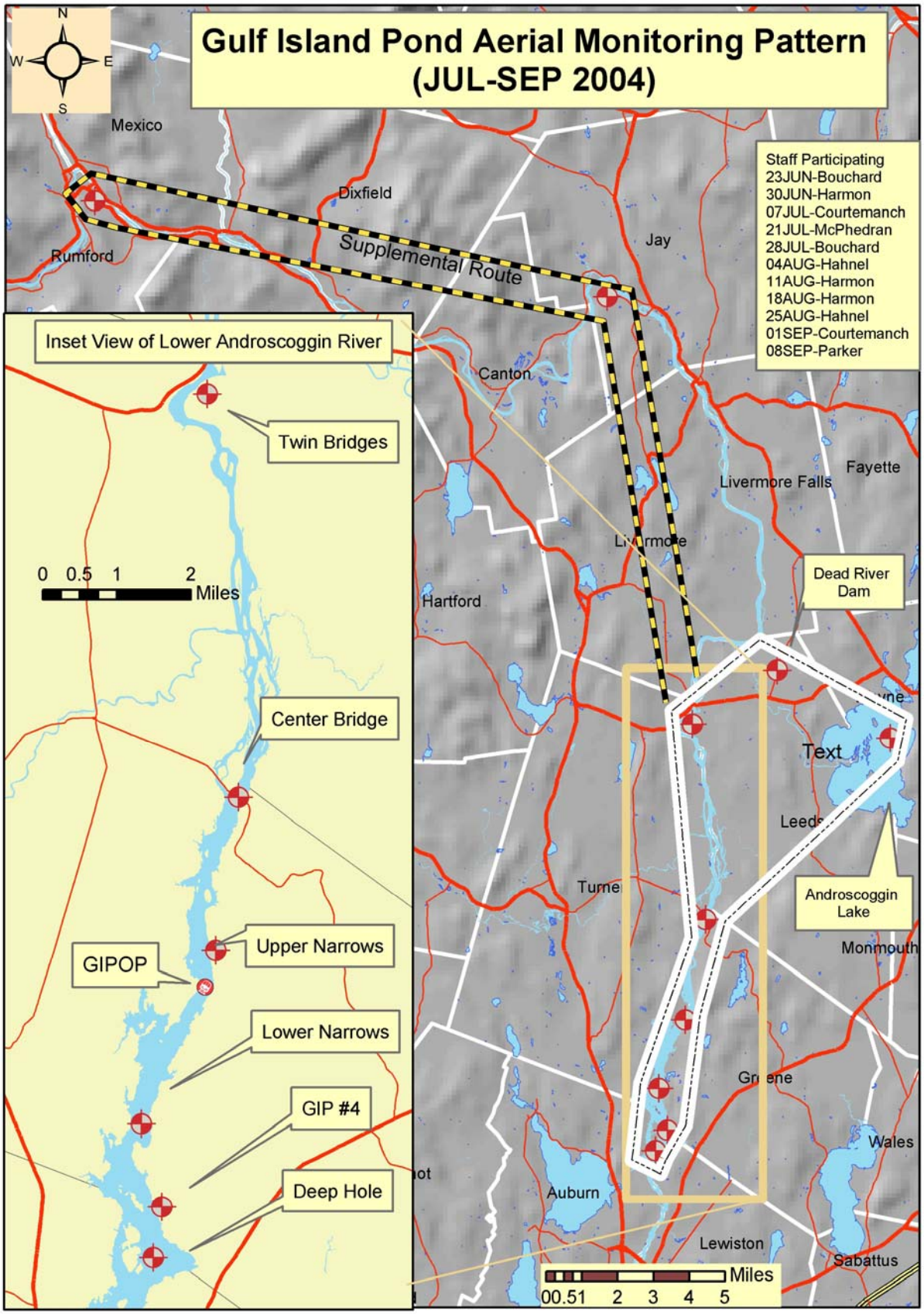
The route was then southerly to DH to determine algae extent and to collect aerial photographs of this location. The route was then northerly to GIP4, LN, GIPOP, UN, TB, AL, DRD, TwB to collect aerial photographs and at these locations and to collect additional water samples if needed/possible based on observations.

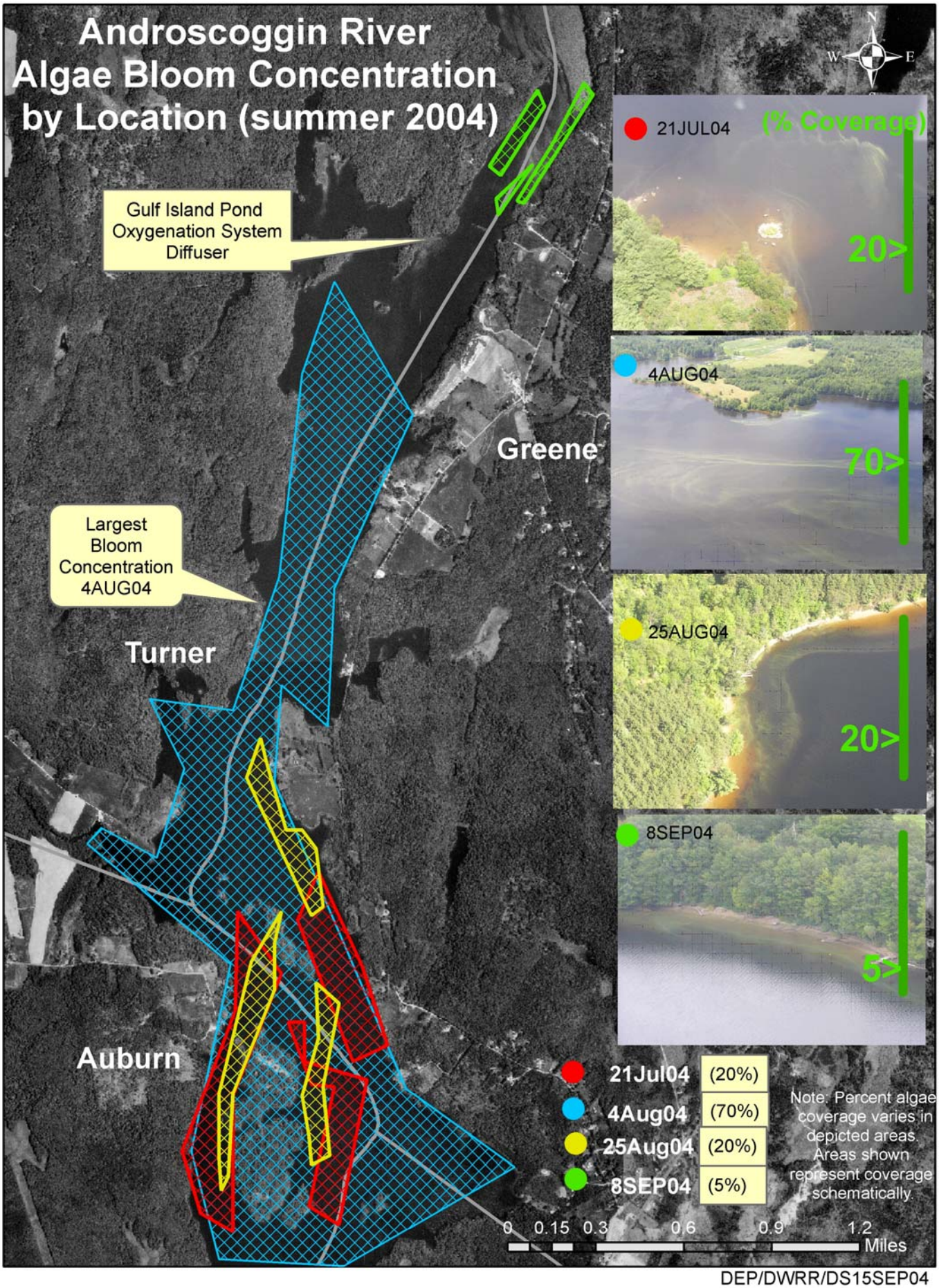
On certain days, the route was extended to include certain paper mills (IP, Mead, Fraser-NH) upstream from the pond. Photographs of the discharge outfalls were collected and compared with reported discharge levels.

There was one widespread algae bloom and three localized algae blooms that have been documented during the summer of 2004. Please refer to the attached plan showing the locations and extent of the bloom conditions.

Summary & Conclusions

During the summer of 2004, the Gulf Island Pond experienced a wide spread algae bloom on at least one occasion and localized algae blooms on at least three occasions. These blooms were documented during four aerial monitoring events in July, August, and September. The ambient water temperature and flows were characterized as cooler and wetter than normal.


Gulf Island Pond Aerial Monitoring Pattern
(JUL-SEP 2004)
N
W
E
S
Mexico
Dixfield
Rumford
Supplemental Route
Jay
Staff Participating
23JUN-Bouchard
30JUN-Harmon
07JUL-Courtemanch
21JUL-McPhedran
28JUL-Bouchard
04AUG-Hahnel
11AUG-Harmon
18AUG-Harmon
25AUG-Hahnel
01SEP-Courtemanch
08SEP-Parker
Inset View of Lower Androscoggin River
Canton
Twin Bridges
Fayette
Livermore Falls
0 0.5 1 2
Miles
Hartford
Dead River
Dam
Center Bridge
Text
Leeds
Androscoggin
Lake
Turner
Monmouth
GIPOP
Upper Narrows
Lower Narrows
Greene
GIP #4
Wales
Deep Hole
Auburn
Lewiston
Sabattus
Miles
0 0.5 1 2 3 4 5



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